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SPECIFICATIONS FOR AGGREGATE FOR GRANULAR COURSE

## 900. 1 SCOPE

This Specification covers the requirements for the production and supply of Granular Course materials for use in subgrade, subbase, base, gravel surface course, shoulder work and backfill.

## 900. 2 DEFINITIONS

CR- M50: Crushed Rock Minus 50mm, a premium quality granular subbase crushed aggregate typically used below the granular base Layer.

CR- M100: Crushed Rock Minus 100mm, a high-quality granular subbase or fill material typically used below the CR- M50 or GSB- C Layers.

CR- M125: Crushed Rock Minus 125mm, a granular fill material typically used below the CR- M50 or CR-M100 Layers.

Deleterious Material: Material that can affect the performance of the structure and/or cause degradation of the product.

Granular Course: Borrowed granular material which is placed and compacted on the road or in-situ granular material which is regraded and re-compacted.

Granular Base Course: A Layer of granular material typically placed below the bituminous, Portland Cement Concrete (PCC), Chip Seal and granular surface Layers or placed as a top Layer of unpaved (shoulders and gravel road) surfaces.

Granular Subbase Course: A Layer of granular material typically placed below the granular base Layer.

GBC- I: Granular Base Course Type I, a granular base material of premium quality with an excellent balance of drainage, stability and stiffness characteristics, typically used below the bituminous, Portland Cement Concrete (PCC) and granular surface Layers.

GBC- II: Granular Base Course Type II, a high-quality granular base material with a very good balance of drainage, stability and stiffness characteristics, typically used below the bituminous, Portland Cement Concrete (PCC) and granular surface Layers.

GBC- M: Granular Base Course- Modified, a granular base material with a good balance of drainage, stability and stiffness characteristics, typically used below the bituminous and granular surface Layers.

GBC- S: Granular Base Course- Surface, a granular base material with low permeability characteristics, typically used below the AST (Chip Seal) surface or as granular surface Layer material for gravel shoulders and gravel roads.

GSB- C: Granular Subbase Class C, a granular subbase material typically used below the granular base Layer.

GSB- F: Granular Subbase Class F, a granular subbase material typically used as a fill below the granular base or GSB- C Layers.

Physical Property: Inherent attribute or feature of an aggregate material.

900. 3 MATERIALS

3.1 General

Aggregate for Granular Course shall meet the requirements for the Granular Course type (granular base and subbase) listed below and specified in the Contract.

Aggregate and supplementary granular materials shall consist of sound and durable particles of crushed rock, gravel, stone, sand and fines free from injurious quantities of sod, roots, clay lumps and friable particles, organics or other Deleterious Material.

3.2 Granular Course Aggregate Requirements

3.2.1 Granular Base Course

Table 3.1 Granular Base Course Requirements

Passing Sieve Size (Note 1)		GBC- I		GBC- II		GBC- M		GBC- S	
Metric, mm	Imperial	Lower Limit	Upper Limit	Lower Limit	Upper Limit	Lower Limit	Upper Limit	Lower Limit	Upper Limit
25.00	1"	100	100						
19.00	3/4"	80	95	100	100	100	100	100	
16.00	5/8"	70	90	80	95	83	100	85	100
12.50	1/2"	55	83	70	90	70	95	70	95
9.50	3/8"	47	75	60	84	60	87	60	88
4.75	#4	33	60	40	66	40	70	40	70
2.00	#10	20	45	24	48	25	50	25	50
0.85	#20	11	30	14	33	15	35	17	38
0.425	#40	7	21	9	24	10	25	12	30
0.180	#80	5	14	6	16	6	17	8	20
0.075	#200	3 (Note 2)	8 (Note 2)	3 (Note 2)	8 (Note 2)	4	9	6	13
Fractured Faces, Min. %		55		55		40		35	
Plasticity Index, Max. %		3 (Note 2)		3(Note 2)		3		6	
Liquid Limit, Max. %		25		25		25		25	
L.A. Abrasion Loss, Max. %		35 (ASTM C131)		35 (ASTM C131)		35 (ASTM C131)		35 (ASTM C131)	
Total Lightweight Particles Content, Max. %		7		7		7		12	
Clay Lumps and Friable Particles Content, Max. %		2.0		2.0		2.0		3.0	

Table 3.1 Note 1: A maximum of three percent (3%) oversize particles will be allowed provided that the maximum dimension of the oversize particles does not exceed 3mm from the specified maximum size.

Table 3.1 Note 2: If GBC Type I or Type II is used below concrete pavement, the fine content (material passing the 0.075mm sieve) shall be limited to 2 to 6% for such application and the materials passing #40 sieve shall be non-plastic.

3.2.2 Granular Subbase Course

Table 3.2 Granular Subbase Course Requirements

Passing Sieve Size (Note 1)		GSB- C		GSB- F		CR- M50		CR- M100		CR- M125	
Metric, mm	Imperial, in	Lower Limit	Upper Limit	Lower Limit	Upper Limit	Lower Limit	Upper Limit	Lower Limit	Upper Limit	Lower Limit	Upper Limit
125.0	5"									100	100
100.0	4"							100	100		
75.0	3"			100	100			60	100	55	90
50.0	2"					100	100				
37.5	1 1/2"	100	100	75	100	65	100	35	80	30	70
25.0	1"										
19.0	3/4"	70	100	55	100	40	75	20	60	15	55
16.0	5/8"										
12.5	1/2"										
9.5	3/8"	50	95	40	100	25	55	15	45	10	40
4.75	#4	35	80	30	90	15	40	10	35		
2.00	#10	25	60	20	70	10	30				
0.850	#20										
0.425	#40										
0.180	#80										
0.075	#200	5	12	5	15	0	8	0	8	0	8
Fractured Faces, Min. %		20		N/A		100		100		100	
Plasticity Index, Max. %		6		6		Non Plastic		Not Applicable		Not Applicable	
Liquid Limit, Max. %		25		25		25		Not Applicable		Not Applicable	
L.A. Abrasion Loss, Max. %		40 (ASTM C131)		40 (ASTM C131)		40 (ASTM C535)		40 (ASTM C535)		40 (ASTM C535)	
Total Lightweight Particles Content, Max. %		12		12		12		12		12	
Clay Lumps and Friable Particles Content, Max. %		3		3		Not Applicable		Not Applicable		Not Applicable	

Table 3.2 Note 1: A maximum of three percent (3%) oversize particles will be allowed provided that the maximum dimension of the oversize particles does not exceed 3mm from the specified maximum size.

## 900. 4 PRODUCTION

## 4.1 General

Granular Course aggregate shall be produced by crushing with the exception of GSB- F.

The Contractor shall provide the Contract Administrator with at least six days advance notice of their intention to commence the production of aggregate.

The Contract Administrator shall have access to all parts of the production equipment pertaining to the Work.

## 4.2 Production Testing

Granular Course aggregate will be subject to testing by the Contract Administrator during production.

Prior to hauling, the Contractor shall place the processed aggregate in a stockpile until satisfactory production tests have been completed.

Rejected surge piles shall be moved to the vicinity of the feed end of the crusher for re-processing or to an area completely removed from any approved aggregate.

## 4.3 Blending Materials

Where blending of materials from one or more sources and/or sizes is required to meet the specification, each material shall be placed in separate stockpiles and added uniformly by means of a belt type conveyor immediately prior to entering the crusher, pugmill or other approved mixing unit.

If blending materials are too coarse to be fed by a belt type conveyor, the Contractor shall crush the aggregates prior to blending.

The supply and blending of one or more sources and/or sizes of material will be considered as an incidental operation to the payment of the material..

## 900. 5 STOCKPILING

The Contractor shall meet the requirements of the *Specifications for Stockpiling Aggregates (No.600)* in the stockpiling of granular course aggregate.

## 900. 6 SAMPLING AND TESTING

Frequency of sampling and testing will be at the discretion of the Contract Administrator.

## 6.1 Sampling

Granular Course samples for testing, with the exception of CR- M50, CR- M100 and CR- M125, will be in accordance with *MEB P047 Sampling Aggregate Materials for Laboratory Testing*.

- Sampling from the Conveyor Belt
- Sampling from Belt Discharge – Mechanical Sampling Method

If approved sampling devices are not provided for sampling from the moving conveyor belt, the Contractor shall cease operation and lock out equipment for safe sampling.

If any quality issue is suspected in the production of CR- M50, CR- M100 and CR- M125, the Contractor shall sample the stockpile by loader method in accordance with *MEB P047 Sampling Aggregate Materials for Laboratory Testing*.

6.2 Testing

The Contract Administrator will test the Granular Course material as per the test methods listed in Table 6.1 to determine the material characteristics.

Table 6.1 - Test Methods for Physical Properties of Aggregates

Test or Action	Test Method
Gradation	ASTM C136 ASTM C117
Fractured Faces	ASTM D5821
Plasticity Index	ASTM D4318
Lightweight Particles	ASTM C123
Clay Lumps and Friable Particles	ASTM C142
Los Angeles Abrasion	ASTM C131 ASTM C535
Proctor	ASTM D698 ASTM D1557

Table 6.1 Note 1: The heavy liquid used in the test method shall consist of a solution of zinc chloride in water.

The Contract Administrator will visually inspect CR- M50, CR- M100 and CR- M125 materials for distribution of different sizes and physical properties including the Deleterious Material contents. If quality issues are suspected, samples will be tested for gradation and/or any physical properties, as directed by the Contract Administrator.

6.3 Previously Prepared Aggregate

The Contract Administrator may accept the use of previously prepared aggregate provided the test result meet Contract requirements.

The Contractor shall, unless otherwise permitted, pass material uniformly over a belt to provide representative samples for testing.

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